DP1715EP

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B62D 55/275 — A1

(11) International Publication Number: WO 96/29234

(43) International Publication Date: 26 September 1996 (26.09.96)

(21) International Application Number: PCT/GB96/00625

(22) International Filing Date: 15 March 1996 (15.03.96)

(30) Priority Data:
9505515.8 18 March 1995 (18.03.95) GB

(71) Applicant *(for all designated States except US)*: WILLIAM COOK CAST PRODUCTS PLC [GB/GB]; Parkway Avenue, Sheffield, South Yorkshire S9 4UL (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: BAKER, Peter, Edward [GB/GB]; 15 Balmer Hill, Gainford, County Durham D12 3EJ (GB).

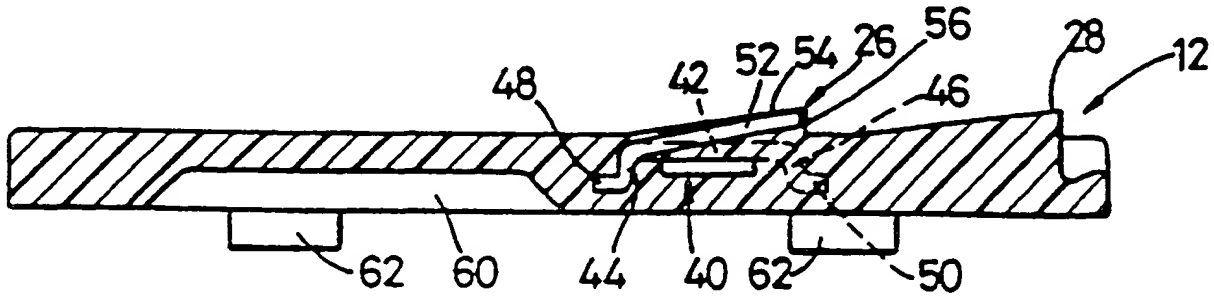
(74) Agent: WALSH, David, Patrick; Dibb Lupton Broomhead, 117 The Headrow, Leeds LS1 5JS (GB).

(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

With international search report.

(54) Title: ROAD PADS FOR TRACKED VEHICLES



(57) Abstract

A road pad (10) for a tracked vehicle such as a tank is disclosed. The pad consists of a plastics backing plate (12) and a rubber cushion (14) bonded to the backing plate (12). The plate (12) includes latching projections (26, 28) which engage with latching surfaces (30, 32) in a track link to retain the pad (10) in place. One or more pressed steel reinforcing elements (40) are encapsulated within the backing plate (12) or between the backing plate (12) and the rubber cushion (14) and extend into the latching projections (26, 28) to reinforce them. The reinforcing elements (40) are cheap to manufacture and, being encapsulated, are not prone to corrosion.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia
AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CS	Czechoslovakia
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgystan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakhstan
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam

ROAD PADS FOR TRACKED VEHICLES

This invention relates to road pads for tracked vehicles such as tanks. Road pads are incorporated into the tracks to cushion the impact between the tracks and the surface upon which the vehicle is driven. Between adjacent plates of the track, track links are located, coupled to the plates via bushes, to allow articulation of the track. The road pads are usually fixed to the track links.

An example of an arrangement as described above can be found in UK patents nos. 1077444 and 1405742. In each case, the pad consists of a metallic backing plate and a rubber cushion bonded to one side of the backing plate. The edges of the backing plate project beyond the cushion and acts as guides which enable the pad to be slid into cooperating grooves in the track link. Part of the backing plate is cut out and raised to form a latching projection which cooperates with a latch on the track link to retain the pad in place.

These road pads have been found to suffer from a number of disadvantages. Firstly, the size of the backing plate and the cost of the material from which it is made contribute significantly to the cost of producing the pad. Many pads are used on each vehicle and the cost of kitting out the vehicle is increased accordingly. Secondly, the backing plate is prone to corrosion. Although the life of the backing plate exceeds that of the rubber cushion, the pad can be reconditioned by vulcanising a replacement cushion to the plate. Corrosion of the plate can reduce considerably the number of times the pad can be reconditioned.

It has recently been proposed to manufacture road pads almost entirely from polymeric material. The backing plates are formed from hard plastics material, either plain or fibre reinforced, to which the rubber cushion is bonded. The strength of the backing plate is sufficient to form the guide projections on either side of the pad to enable it to

slide in and out of the track link. However, to date, no plastics backing plate material has been able to deal with the stresses which must be withstood by the latching projection. Such plastics-backed pads are therefore provided with metallic reinforcements moulded into the backing plate and projecting from it to form the latching projection. Such reinforcements are machined and are therefore expensive to manufacture. They are also subject to corrosion.

It is an object of the present invention to address these problems. Accordingly, the present invention provides a road pad adapted for sliding engagement within a track link, the pad comprising a body of polymeric material having a latching projection adapted to cooperate with an abutment of the link to prevent withdrawal of the pad and in which the latching projection includes a reinforcing element encapsulated within the polymeric material. Because the reinforcing element is encapsulated within the polymeric material, it is not exposed to corrosive elements. As will be explained, the bulk of the latching projection can be formed from the polymeric material, enabling the reinforcing element to be manufactured inexpensively and using cost-effective manufacturing processes.

To give the pad structural rigidity, the body preferably comprises a backing plate and a cushion, the reinforcing element being encapsulated within the backing plate or between the backing plate and the cushion. The backing plate is preferably formed from plastics material and the cushion from a rubber material.

To impart a degree of flexibility to the latching projection, the reinforcing element may be resilient. For example, it may be formed from steel plate.

Preferably, the reinforcing element comprises a flat and a resilient tongue projecting from it into the latching

projection. The flat serves to anchor the reinforcing element in the body or backing plate and the tongue reinforces the latching projection. The tongue need only extend into that part of the latching projection which acts as the abutment surface to retain the pad in place in the track link.

The tongue may be an angled cut-out from the flat or it may be an angled extension of the flat.

For increased security, the body may have two latching projections. Each latching projection may be reinforced by a reinforcing element or alternatively the latching projections may be reinforced by a common reinforcing element. Such a common reinforcing element may comprise a flat and two tongues projecting from it into the latching projections. The reinforcing element may form a channel section with the tongues as the uprights of the channel.

The present invention will now be described with reference to the accompanying drawings in which:

figs. 1A and 1B illustrate a road pad made from a plastics backing plate and a rubber cushion;

fig. 2A is a lateral section through a track link for use with such a plastics-backed plate;

fig. 2B shows in longitudinal section a pad installed in the link of fig. 2A; and

figs. 3A, 3B to 16A, 16B show in plan and in section a variety of reinforced plastics backing plates for use in a pad according to the present invention.

As can be seen from figs. 1A and 1B, a typical plastics-backed pad 10 consists of a rubber cushion 14 vulcanised onto a plastics backing plate 12. At either side of the pad, the edges of the backing plate 12 extend beyond those of the cushion 14 to form guides 16, 18. These guides are tapered at their leading edges and cooperate with grooves 20, 22 in the track link 24 illustrated in fig. 2. The pad 10 is located in the link 24 and pushed into place such

that the guides 16, 18 slide within the grooves 20, 22. When the pad is pushed fully home, latching projections 26, 28 cooperate latching surfaces 30, 32 in the track link to retain the pad in place. The pad can be removed by releasing the latching projections 26, 28 from the latching surfaces 30, 32 using a specially-designed tool.

Fig. 3A shows in plan and fig. 3B in section a reinforced, moulded plastics backing plate 12 for use in a pad according to the present invention. The plate 12 is similar to the plate 12 illustrated in figs. 1A and 1B, but one of the latching projections 26 is strengthened by a reinforcing element 40. The reinforcing element 40 is formed from pressed steel plate and consists of a flat 42, both ends of which are turned down to form legs 44, 46 and include a return bend which forms feet 48, 50.

A substantially rectangular section is stamped out of the steel sheet on three sides to form a cut-out tongue 52 which is bent out of the plane of the flat 42 along its fourth side and projects into the latching projection 26. The tongue 52 lies close to the inclined outer surface 54 of the latching projection 26 and extends almost as far as its abutment surface 56, i.e. the surface which engages a latching surface 30 of the track link 24. The pad includes a second latching projection 28 which is not reinforced.

The surface of the backing plate 12 opposite the latching projections includes a depression 60 and keys 62 which help the vulcanised rubber cushion to bond to it.

The backing plate 12 is injection moulded with the reinforcing element 40 in situ. The correct positioning of the insert 40 to ensure in this case that it does not contact the surfaces of the mould is important. The insert 40 is positioned in the mould by means of stepped retaining pins together with magnets which ensure that the insert 40 is not dislodged from the pins during the injection moulding process. Subsequently a rubber cushion 14 (not

shown) is vulcanised to the recessed and keyed surface of the backing plate 12.

Fig. 4A shows in plan and fig. 4B in section a reinforced, moulded plastics backing plate 12 in which both latching projections 26, 28 are reinforced by a common reinforcing element 40. The reinforcing element is again formed from pressed steel and is similar to the reinforcing element 40 of figs. 3A and 3B, but includes two substantially rectangular cut-out tongues 52, 53, each of which reinforces a respective latching projection 26, 28.

Figs. 5A and 5B show a plastics backing plate 12 including a single reinforcing element 40 similar to that illustrated in figs. 3A and 3B, but in which the flat 42 is not turned down at either edge. In all essential respects, the reinforcing element is identical to that shown in figs. 4A and 4B, save insofar as it only reinforces one latching projection 26.

Figs. 6A and 6B, 7A and 7B and 8A and 8B show three different designs of plastics backing plate 12 in which just one latching projection 26; 28 is reinforced. Again the reinforcing elements 40 are formed from pressed or rolled steel, but the tongue 52 is merely an extension of one end of the flat 42 and extends at ninety degrees to it. The tongue extends adjacent the abutment surface 56; 57 of the latching projection 26; 28 to provide the requisite reinforcement.

It is clear from figs. 6B, 7B and 8B that the reinforcing element 40 is coterminous with the surface of the backing plate 12 to which the rubber cushion is to be bonded. There is no need when manufacturing this plate 12 to prevent the reinforcing element 40 from contacting the surface of the mould; indeed that possibility can be exploited to advantage by locating the reinforcing element 40 on the requisite surface and retaining it there by means of magnets during the injection moulding process. When the

rubber cushion is vulcanised in place, the encapsulation of the reinforcing element within the polymeric material is complete.

Figs. 9A and 9B illustrate a backing plate 12 including two reinforcing elements 40, 41 which are essentially identical to those shown in figs. 6A and 6B. Each reinforcing element reinforces a respective latching projection.

Figs. 10A and 10B illustrate a backing plate 12 in which a common reinforcing element strengthens both latching projections. The reinforcing element 40 is again formed from rolled steel plate, but two tongues 52, 53 project upwards from the flat 42 to form a reinforcing element 40 in the from of a channel section. Both latching projections 26, 28 are reinforced by a respective tongue 52, 53.

Figs. 11A and 11B, 12A and 12B and 13A and 13B show three different designs of plastics backing plate 12 in which one or two latching projections 26, 28 are reinforced by dowels 55 which are welded to and project from the flat 42 of a reinforcing element 40 at right angles. The dowels are located adjacent the latching surfaces 56, 57 of the latching projections 26, 28 in question.

Figs. 14A and 14B, 15A and 15B and 16A and 16B show three different designs of plastics backing plate 12 in which one or two latching projections 26, 28 are reinforced by a continuous reinforcing element 40 which closely follows the contours of the latching projections 26, 28. In figs. 14A, 14B, 15A and 15B, the reinforcing element 40 consists of a flat 42, an upstand 60 and an angled continuation 62 lying below the tapered surface of the latching projection. In figs. 16A and 16B, a further upstand 64 and continuation 66 are provided.

Claims

1. A road pad adapted for sliding engagement within a track link, the pad comprising a body of polymeric material having a latching projection adapted to cooperate with an abutment of the link to prevent withdrawal of the pad and in which the latching projection includes a reinforcing element encapsulated within the polymeric material.

2. A pad according to claim 1 in which the body comprises a backing plate and a cushion, the reinforcing element being encapsulated within the backing plate or between the backing plate and the cushion.

3. A pad according to claim 2 in which the backing plate is formed from plastics material.

4. A pad according to claim 2 or claim 3 in which the cushion is formed from a rubber material

5. A pad according to any preceding claim in which the reinforcing element is resilient

6. A pad according to claim 5 in which the reinforcing element is formed from steel plate

7. A pad according to any preceding claim in which the reinforcing element comprises a flat and a limb projecting from it into the latching projection.

8. A pad according to claim 7 in which the limb is a resilient tongue.

9. A pad according to claim 8 in which the tongue is an angled cut-out from the flat

10. A pad according to claim 8 in which the tongue is an angled extension of the flat.

11. A pad according to claim 7 in which the limb is a dowel projecting from the flat.

12. A pad according to claim 7 in which the limb is an upstand projection from the flat and the reinforcing element further comprises a continuation of the upstand which lies adjacent the surface of the latching projection.

13. A pad according to any preceding claim in which the body has two such latching projections

14. A pad according to claim 13 in which each latching projection is reinforced by a reinforcing element

15. A pad according to claim 13 in which the latching projections are reinforced by a common reinforcing element

16. A pad according to claim 15 in which the reinforcing element comprises a flat and two limbs projecting from it into the latching projections.

17. A pad according to claim 16 in which the reinforcing element forms a channel section with the limbs as the uprights of the channel.

18. A pad substantially as described herein with reference to any one of figures 2A to 16B of the accompanying drawings.

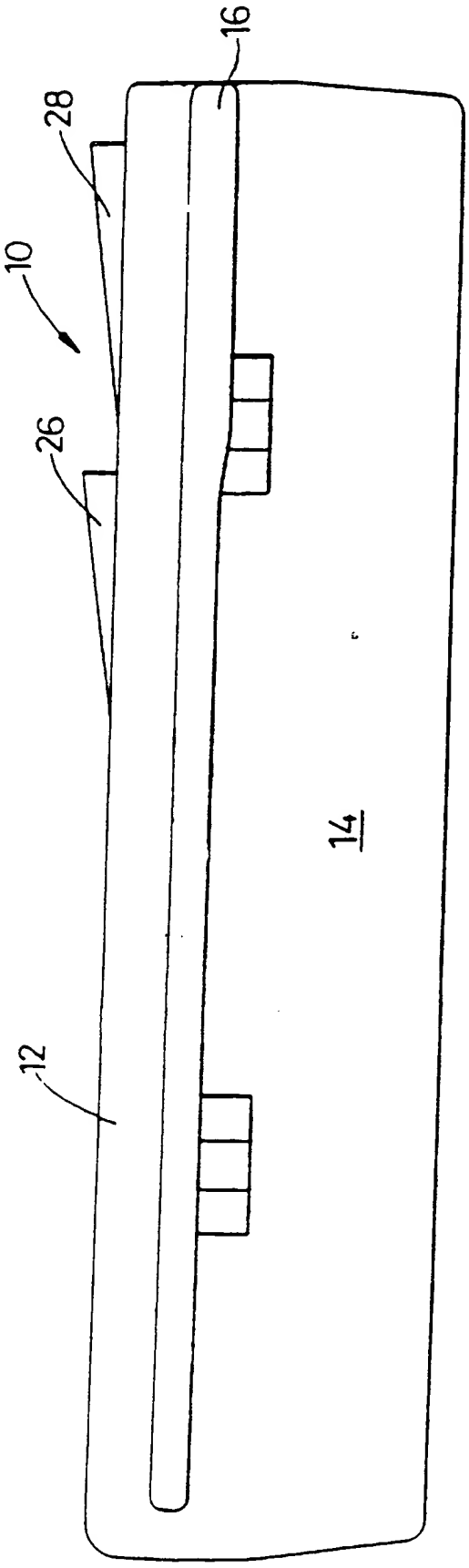


Fig.1A

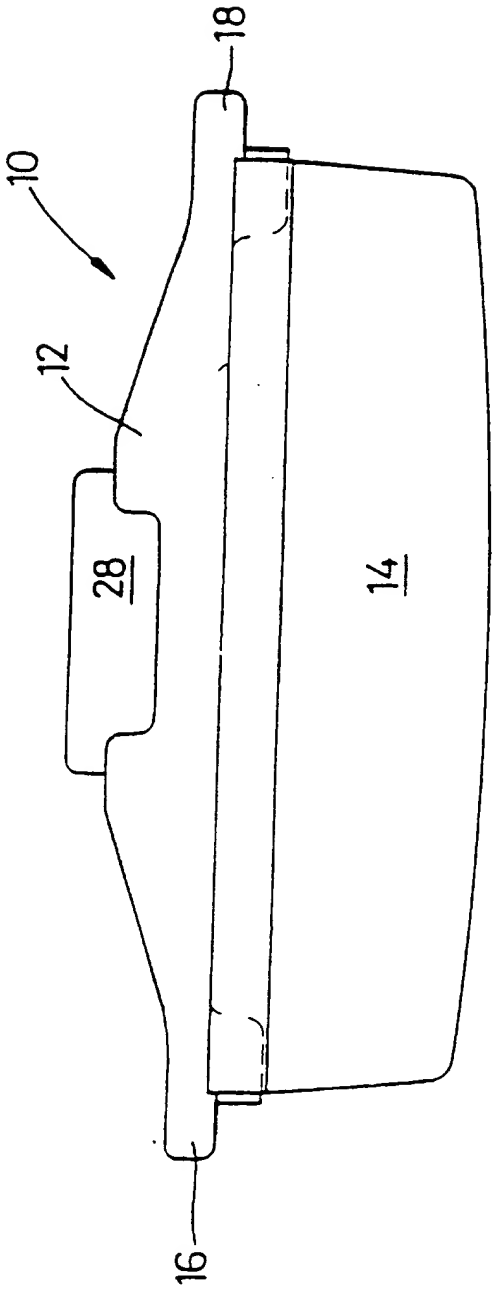


Fig.1B

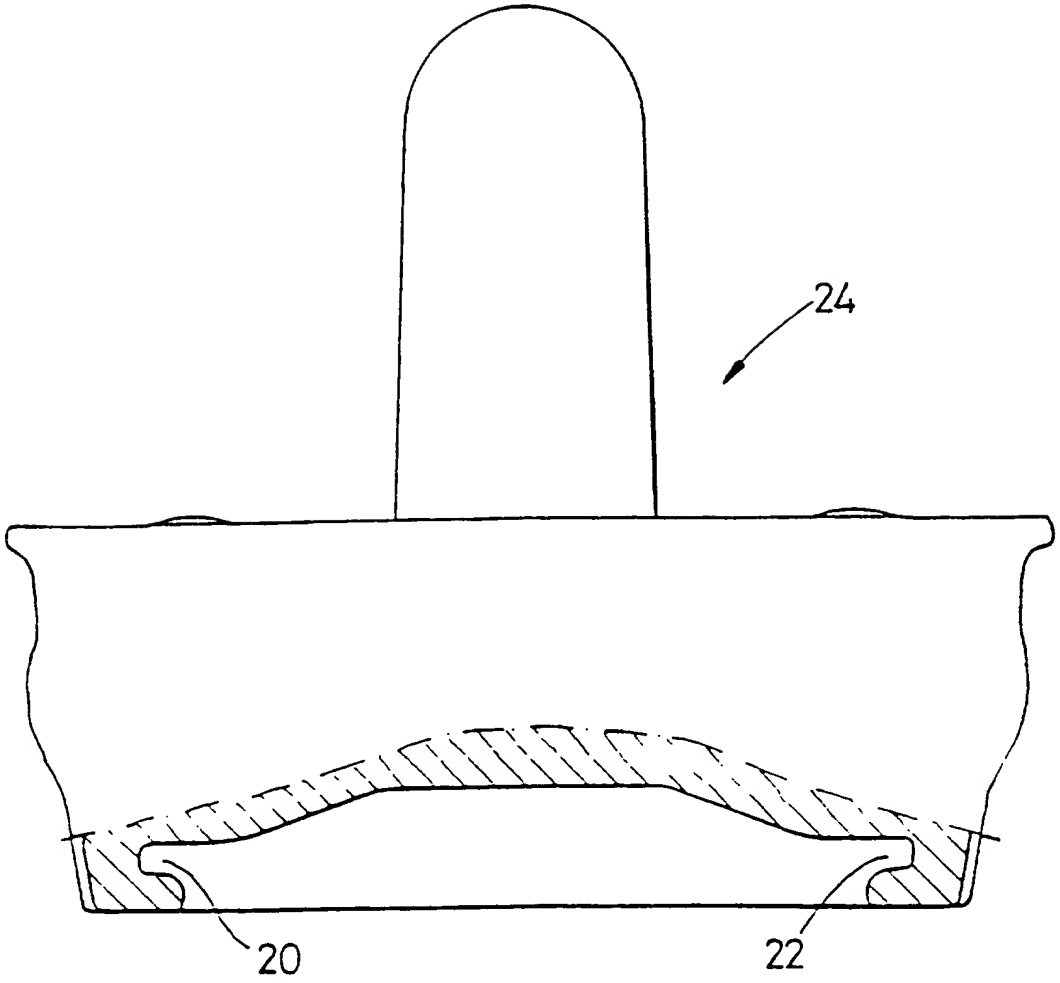


Fig. 2A

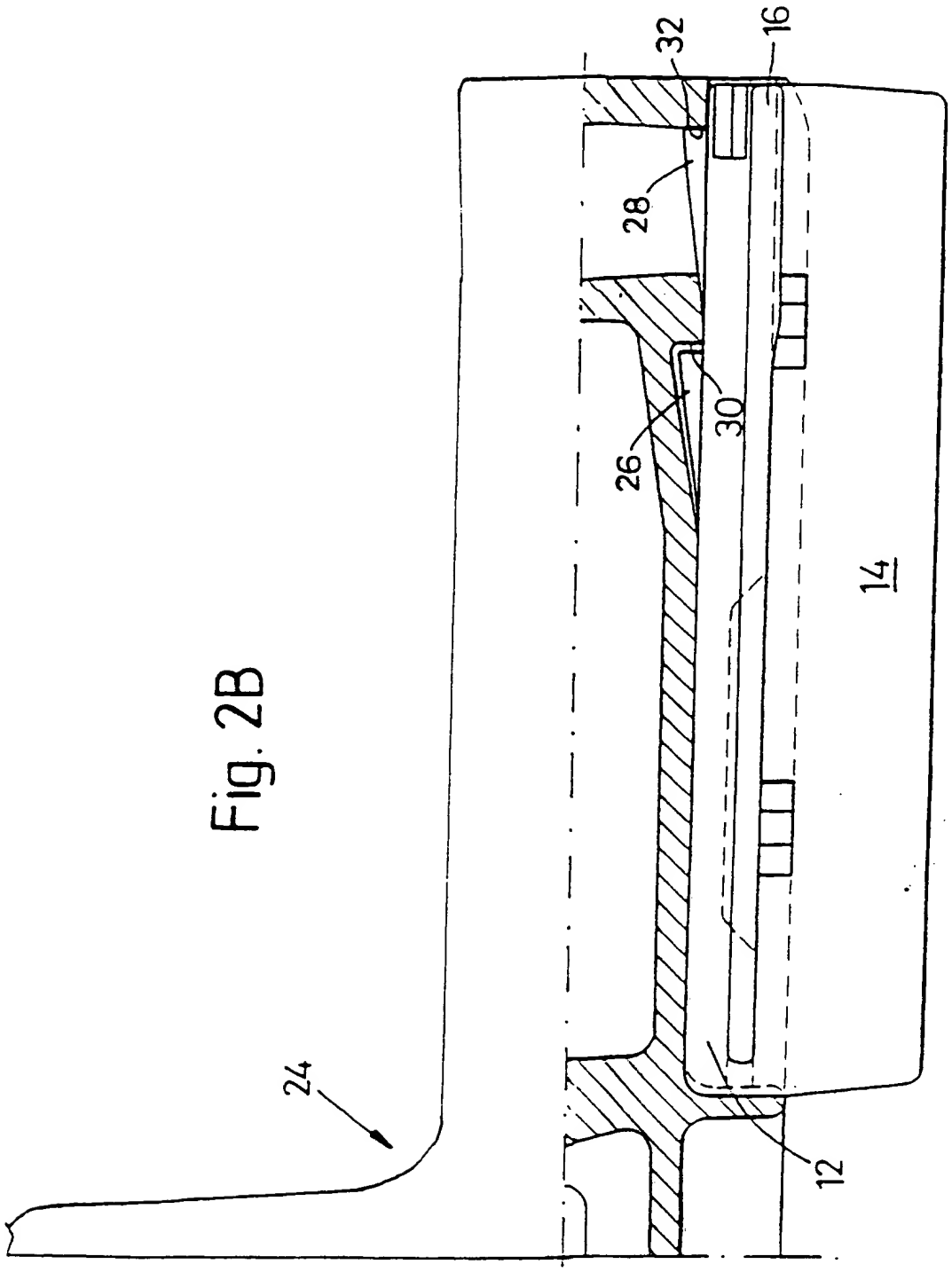


Fig. 2B

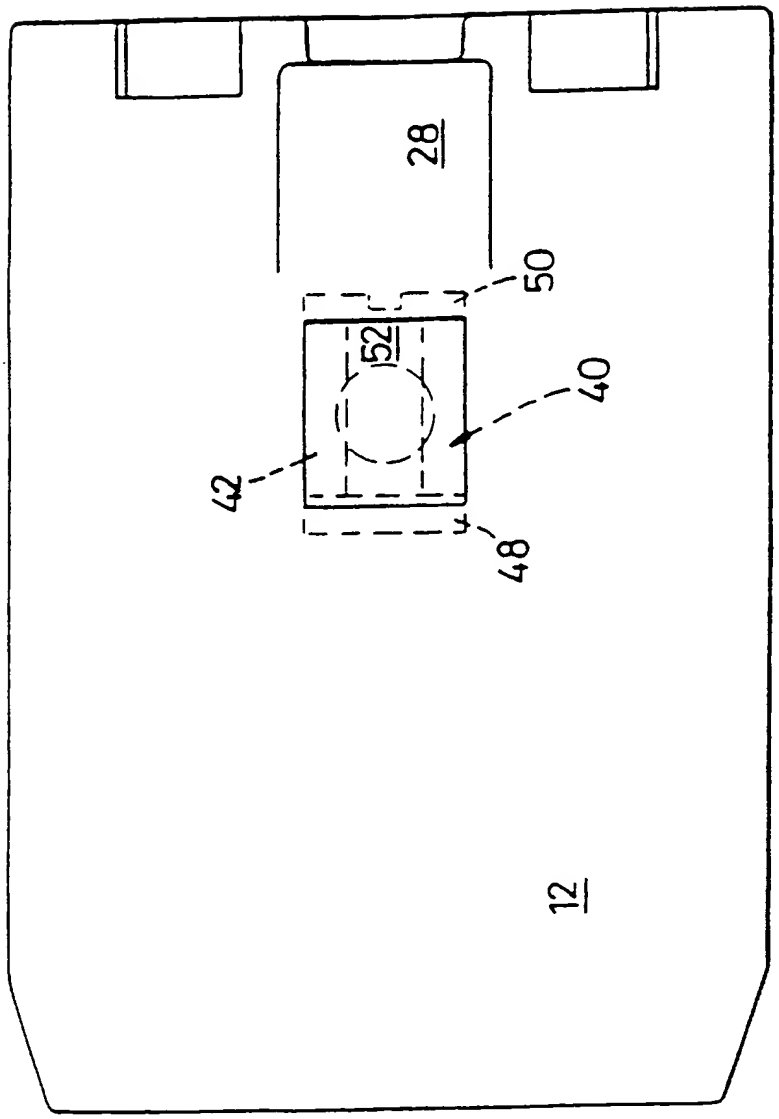


Fig. 3A

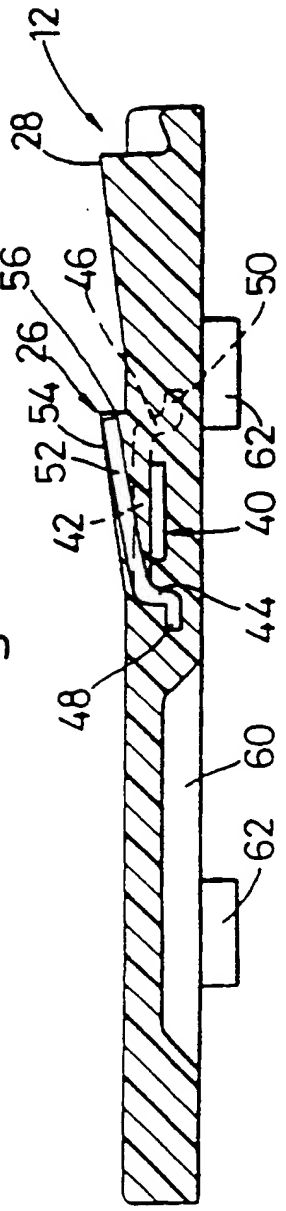


Fig. 3B

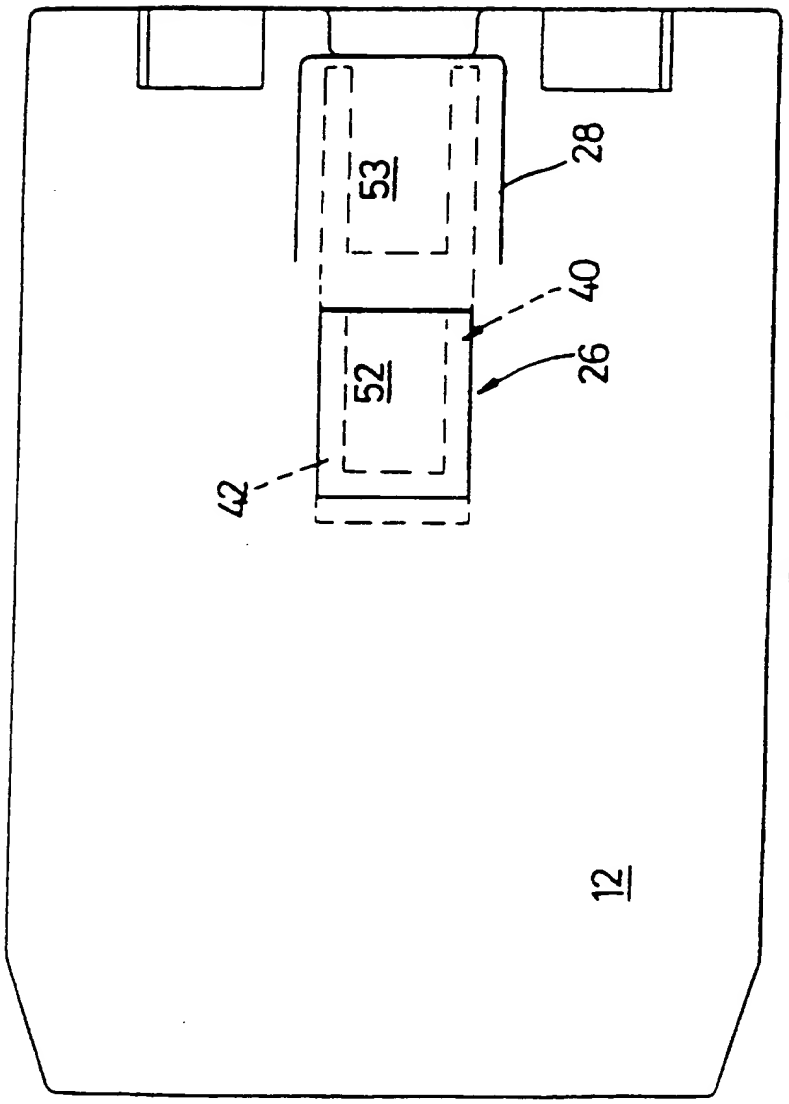


Fig. 4A

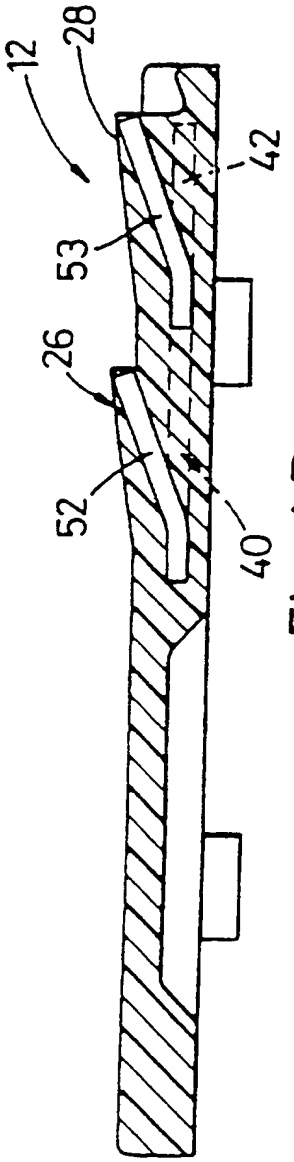


Fig. 4B

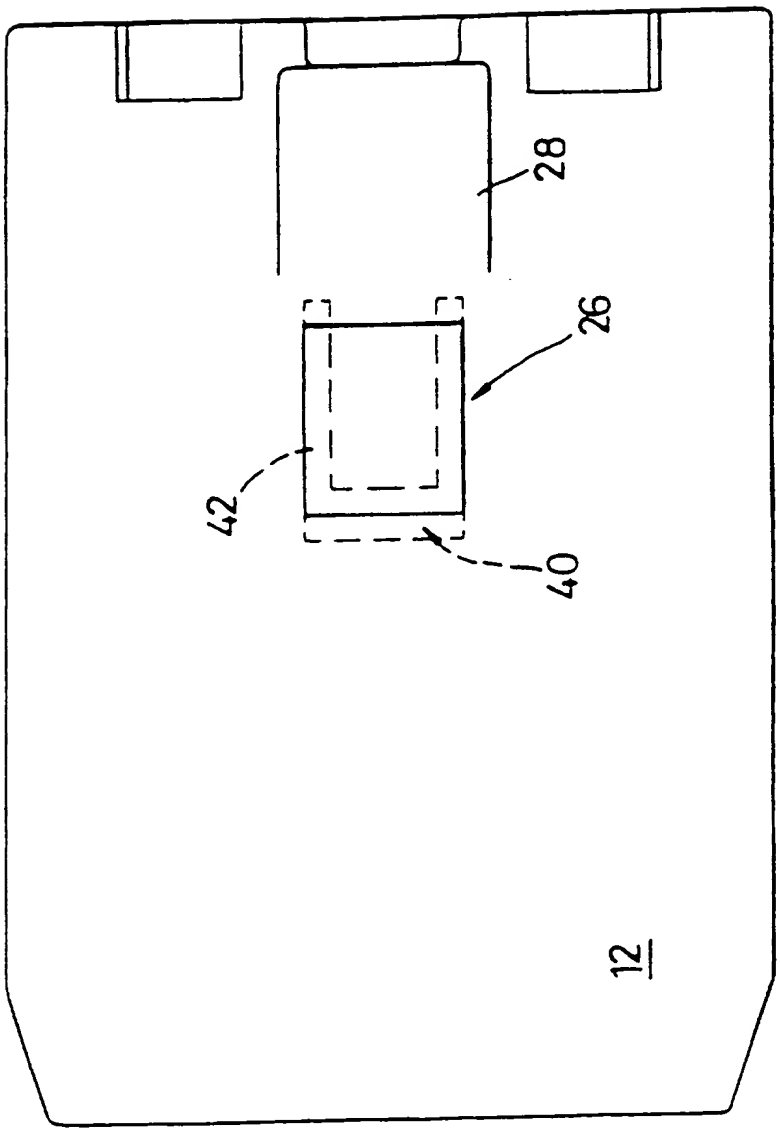


Fig. 5A

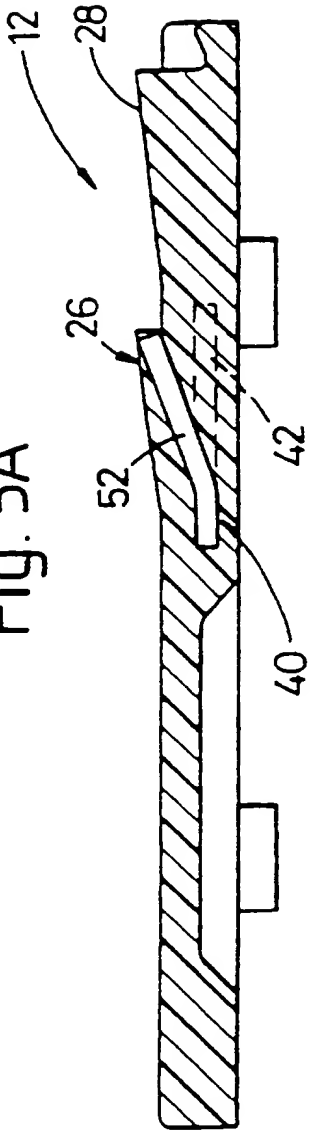


Fig. 5B

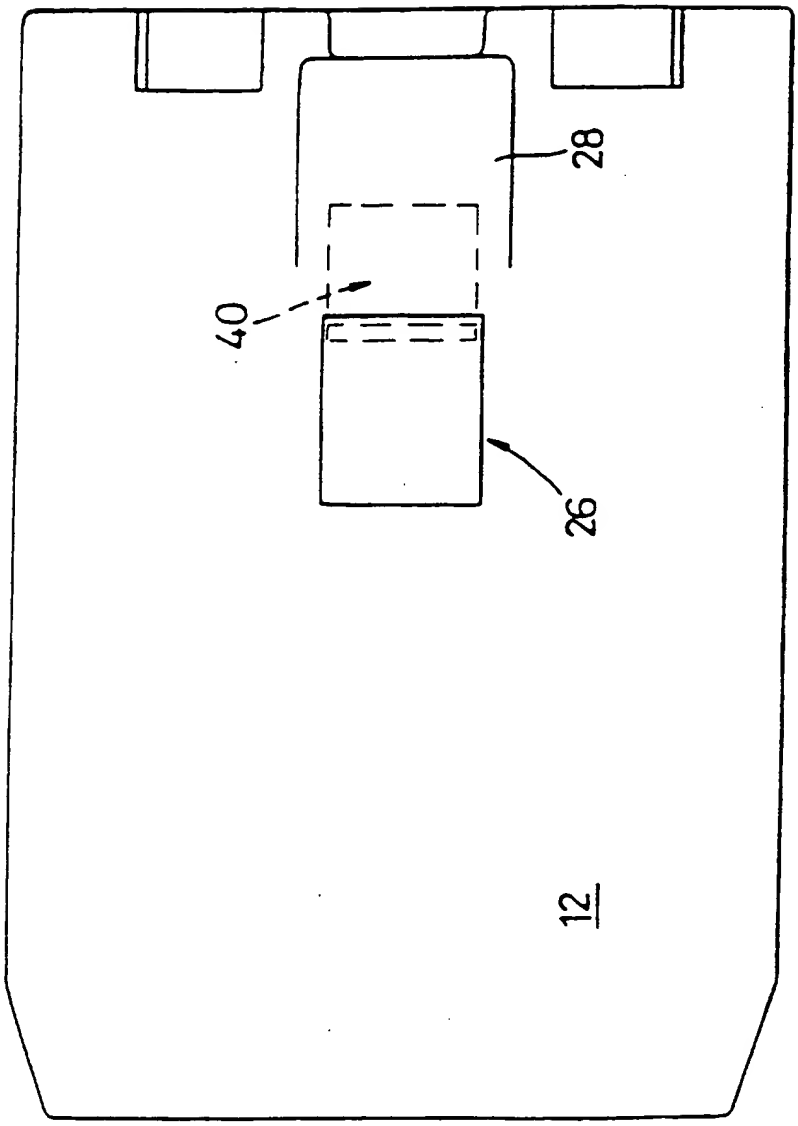


Fig. 6A

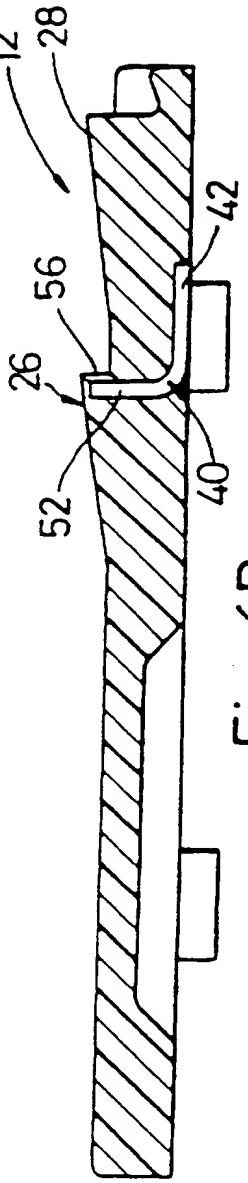


Fig. 6B

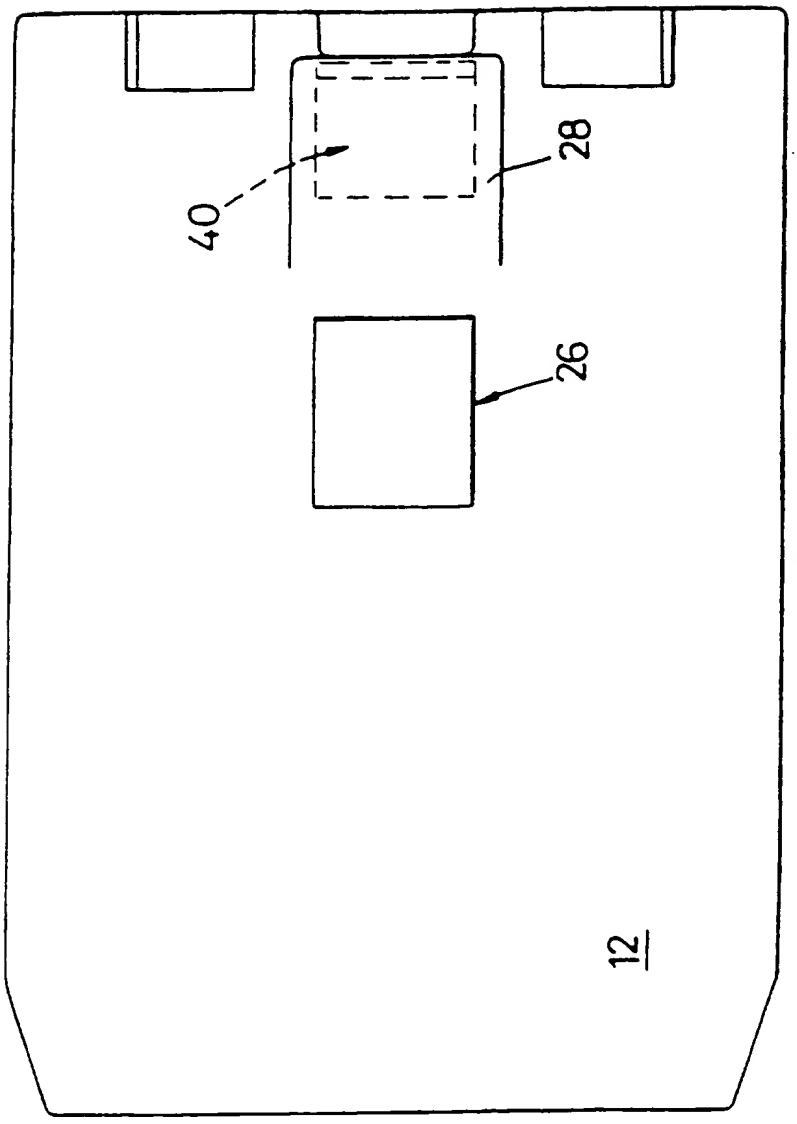


Fig. 7A

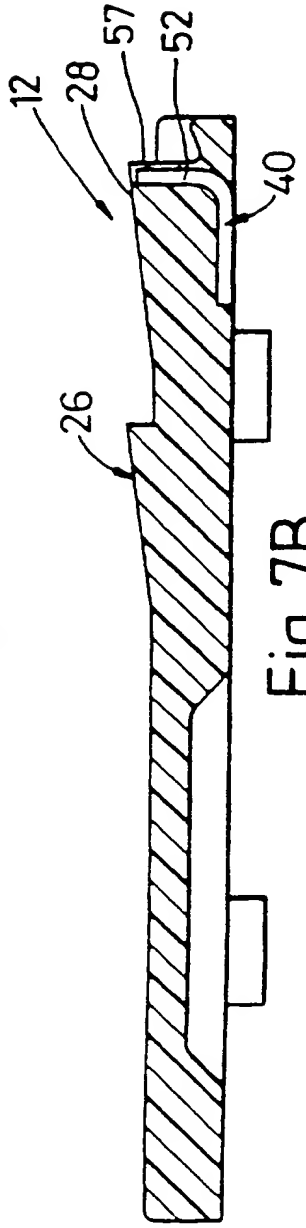


Fig. 7B

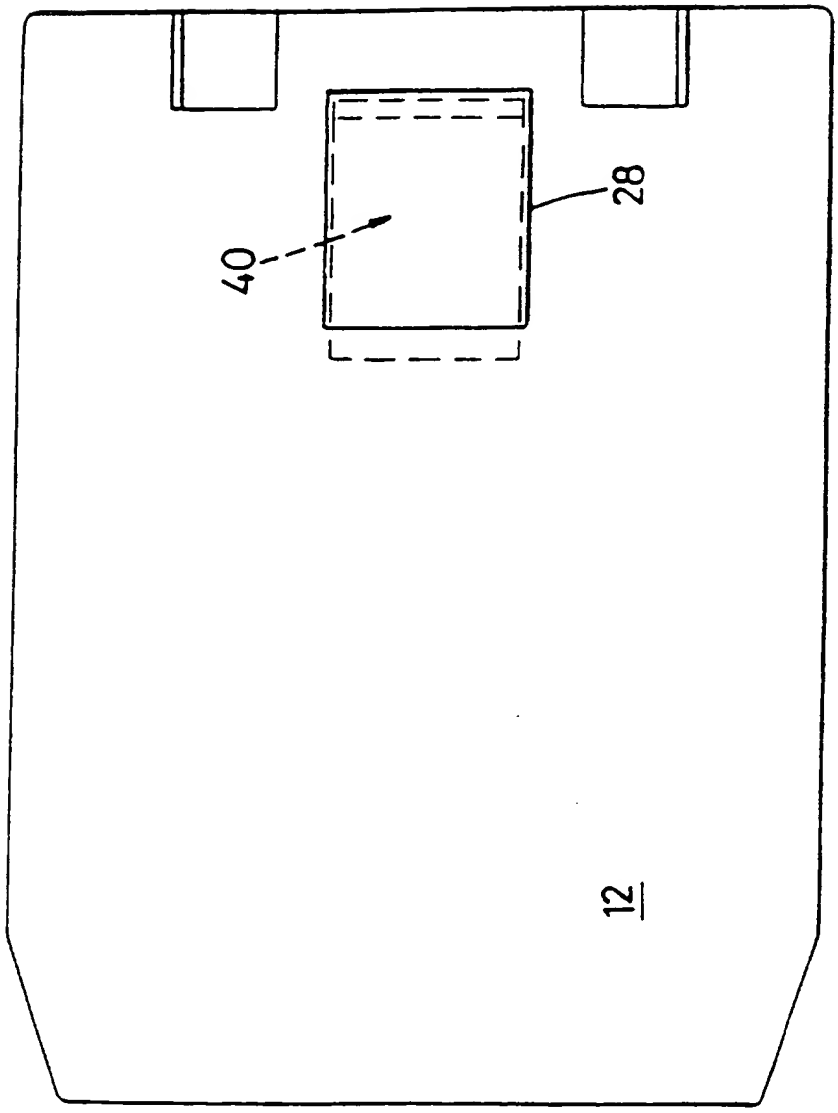


Fig. 8A

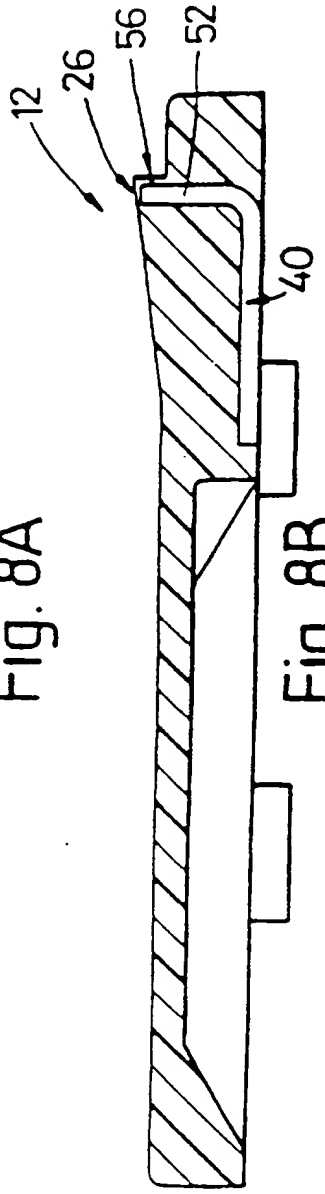


Fig. 8B

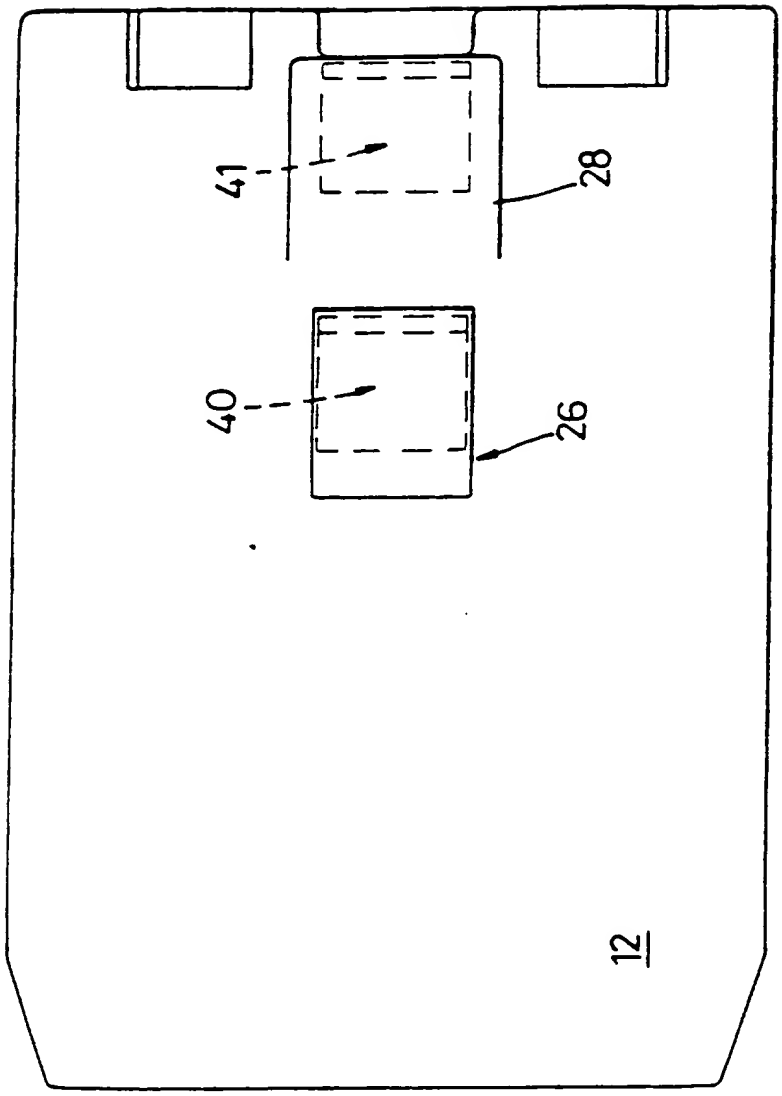


Fig. 9A

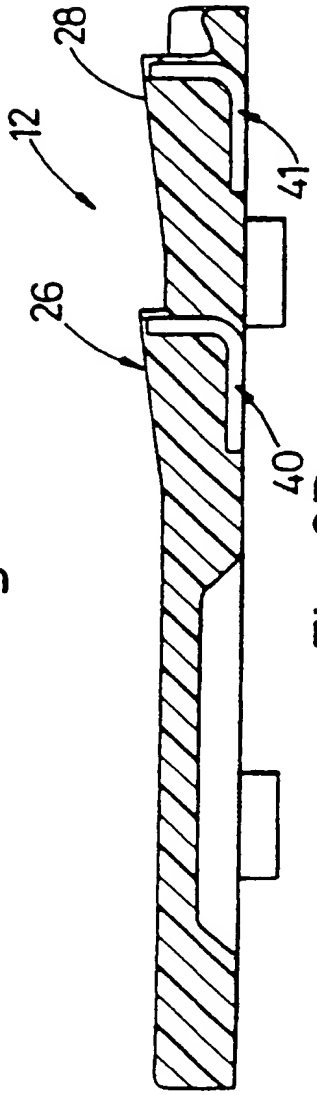


Fig. 9B

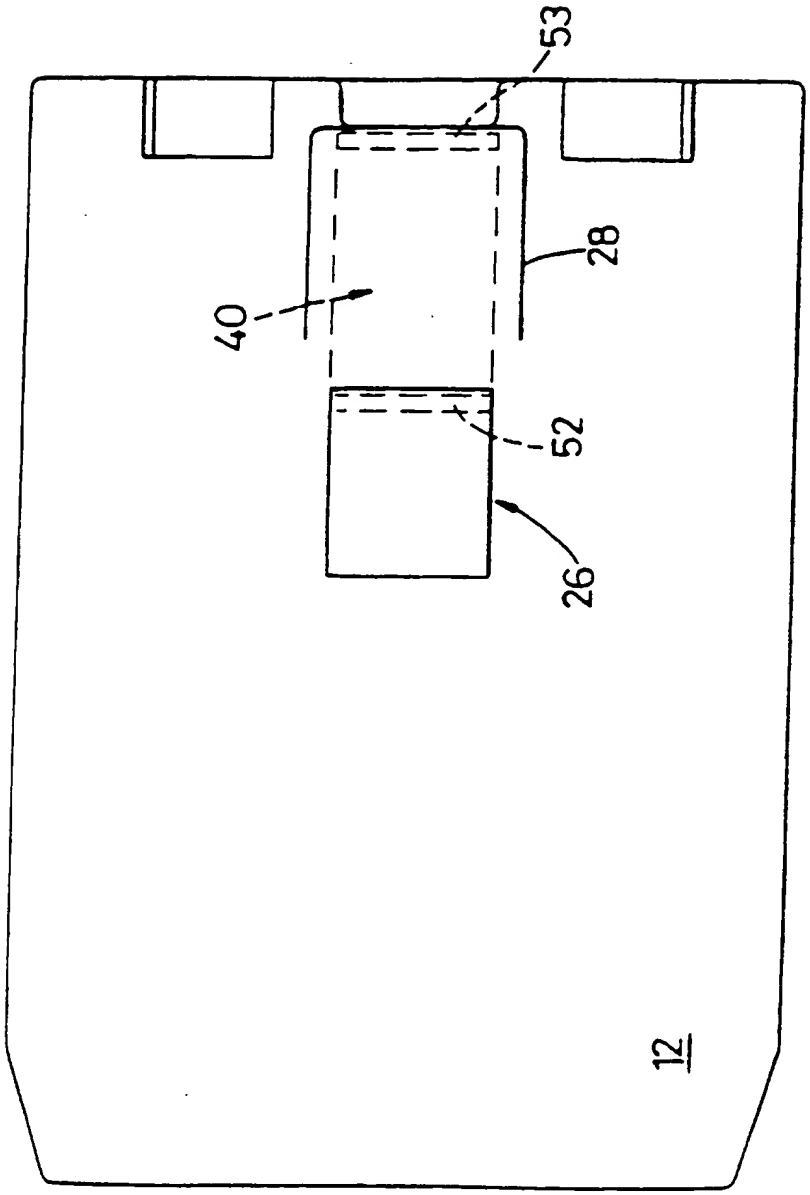


Fig. 10A

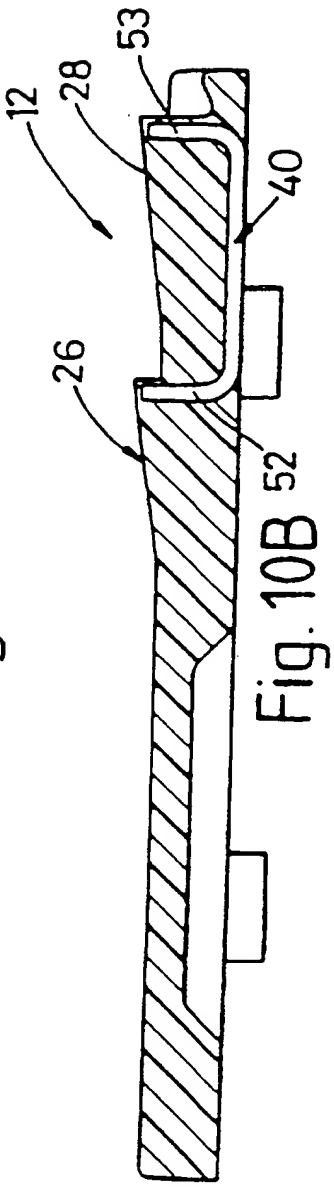


Fig. 10B

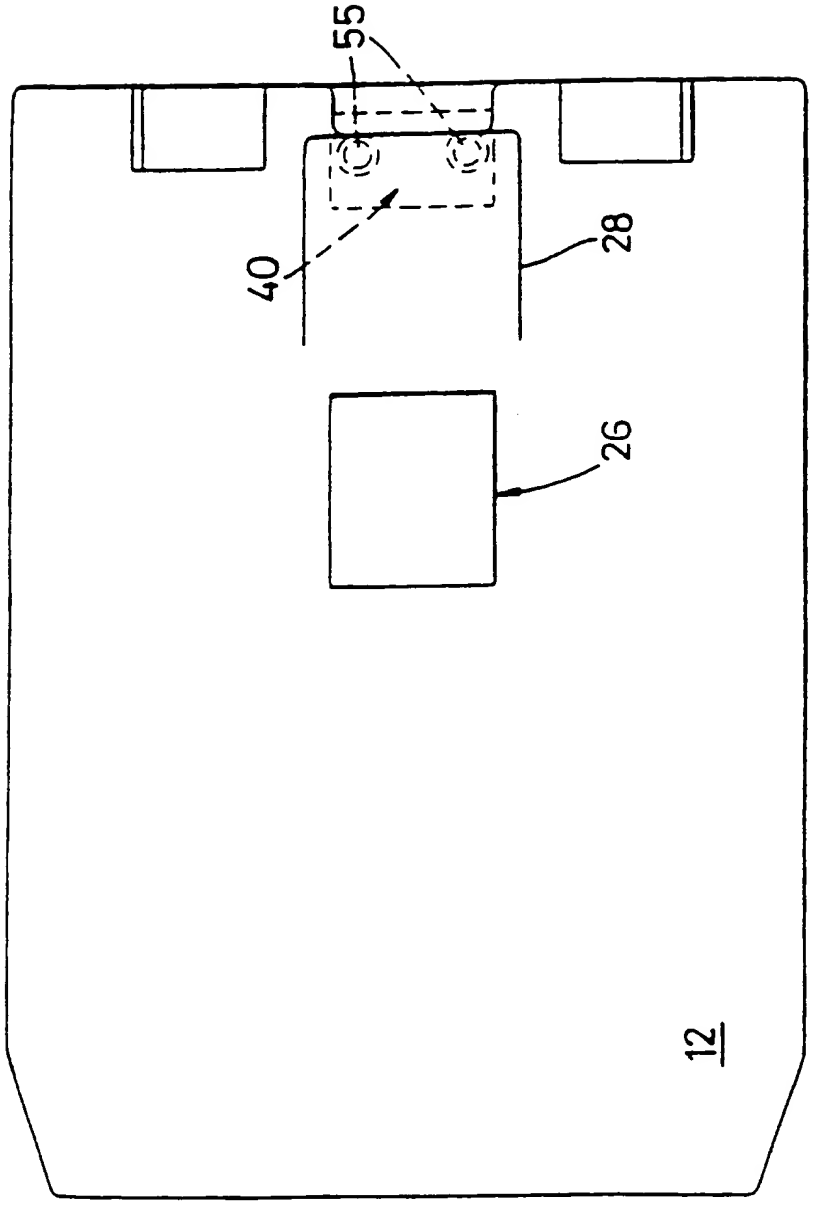


Fig. 11A

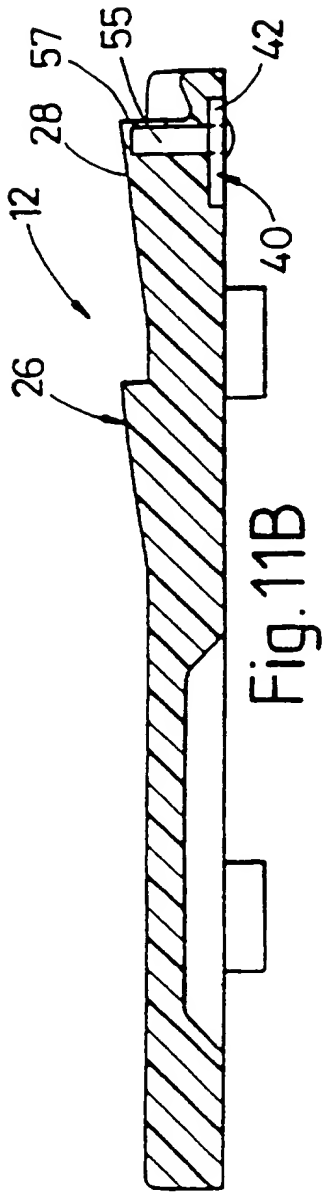


Fig. 11B

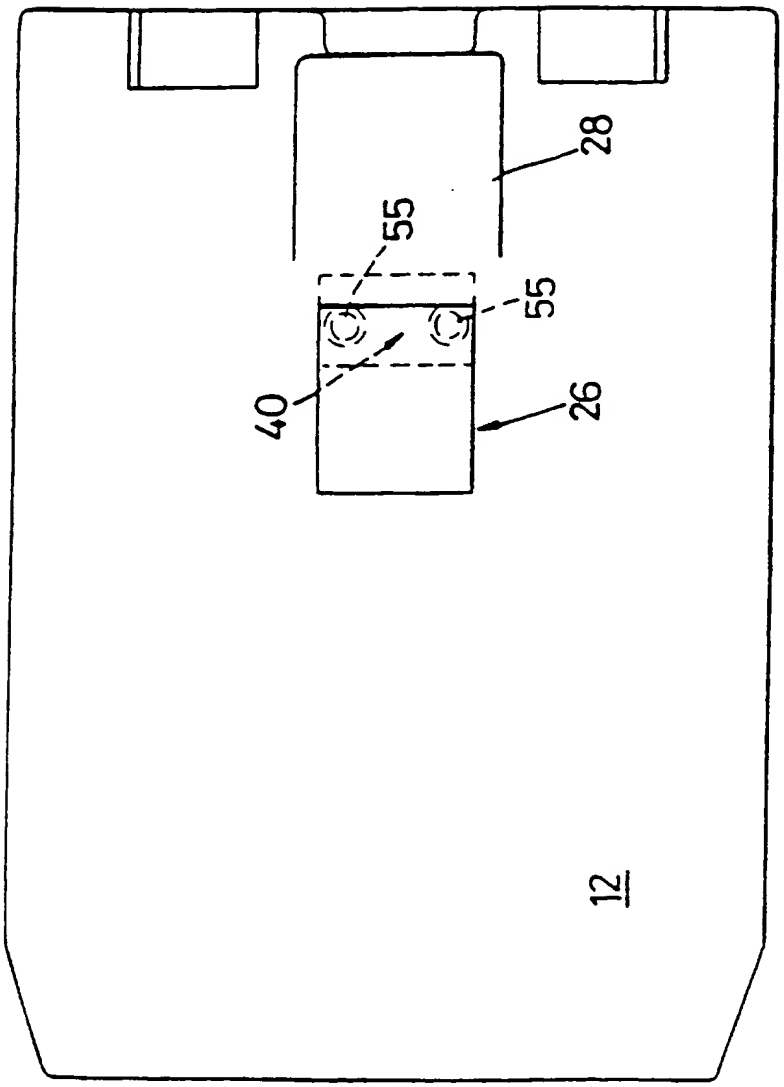


Fig. 12A

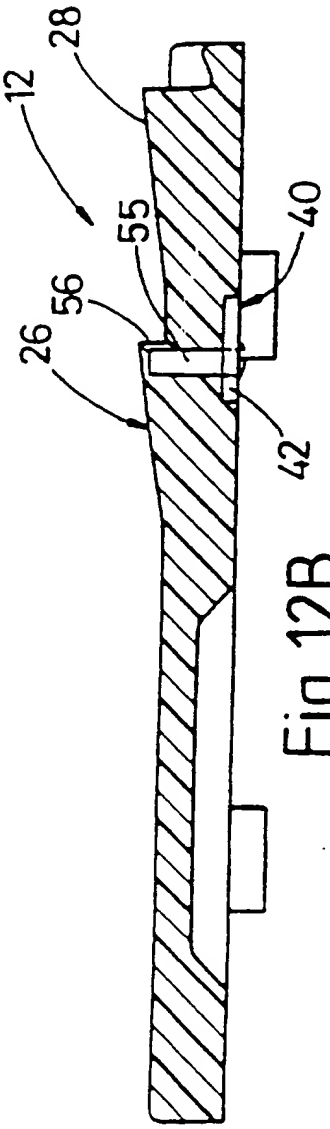


Fig. 12B

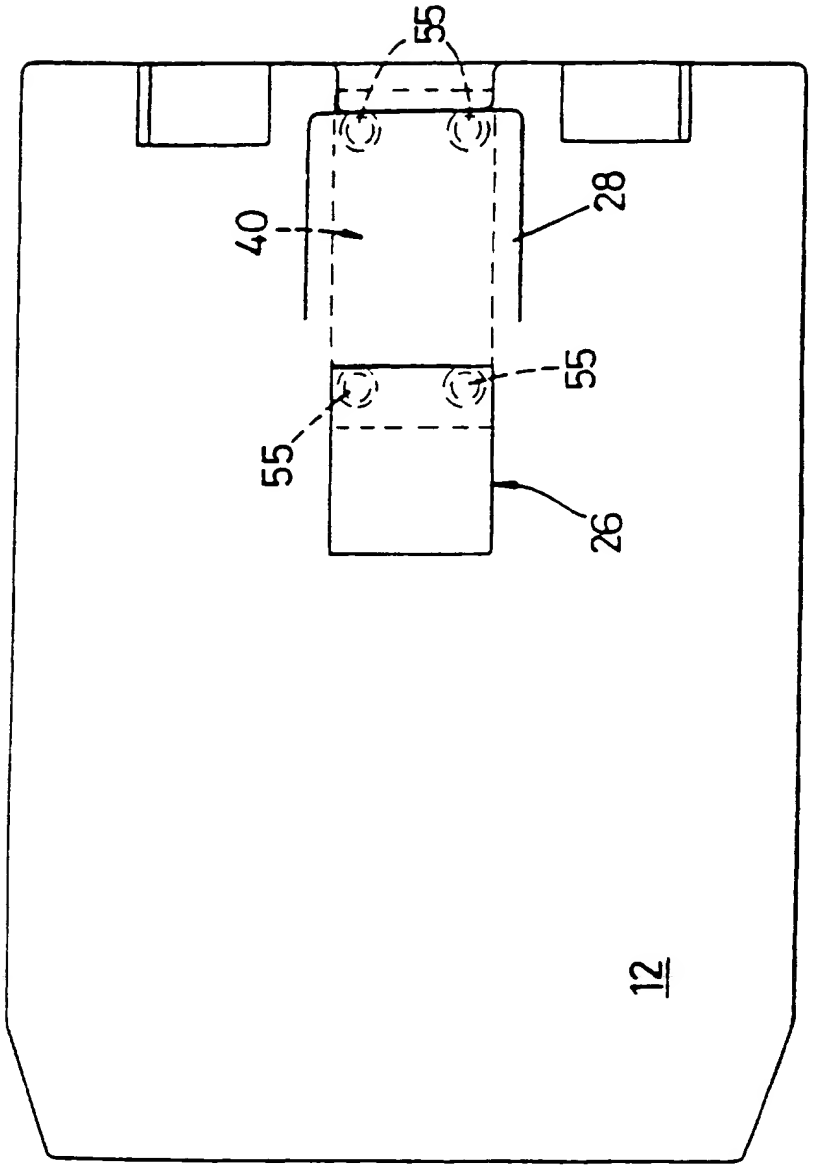


Fig. 13A

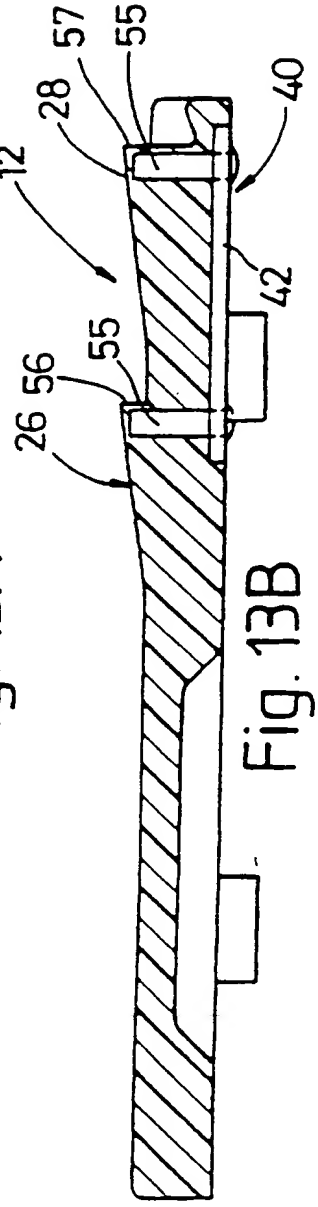


Fig. 13B

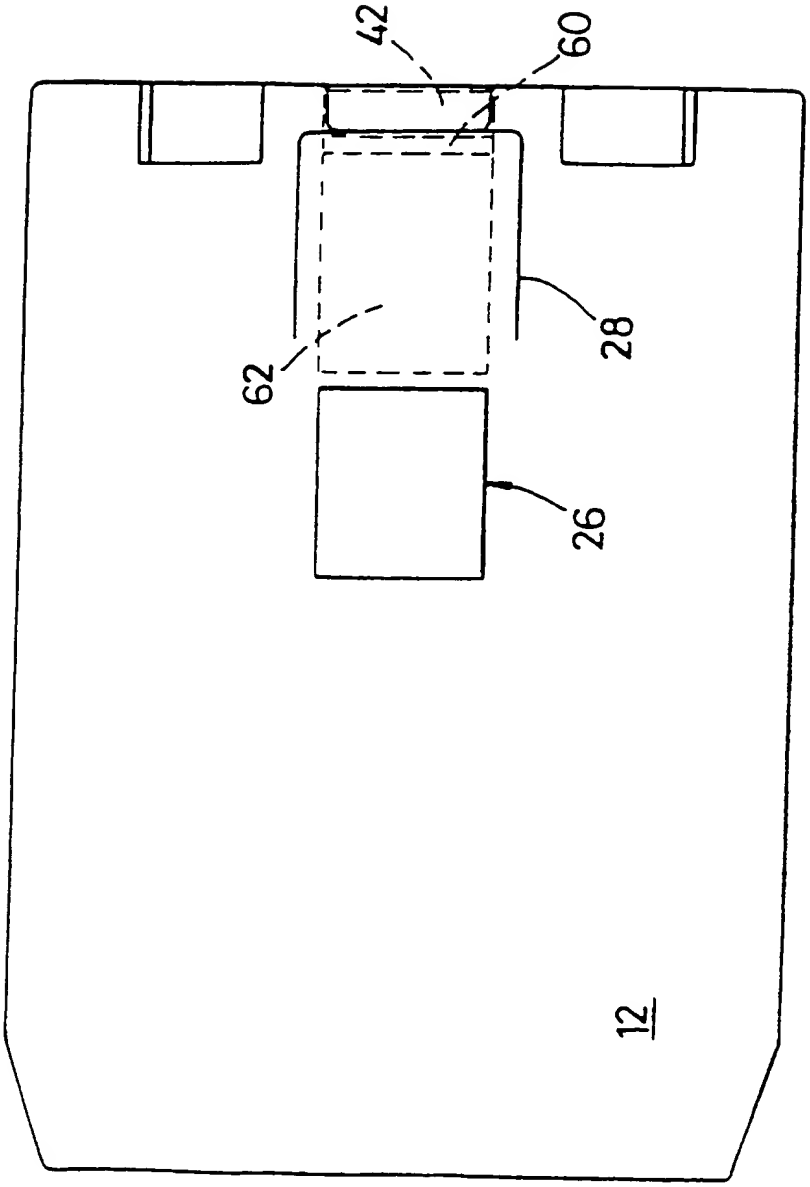


Fig. 14A

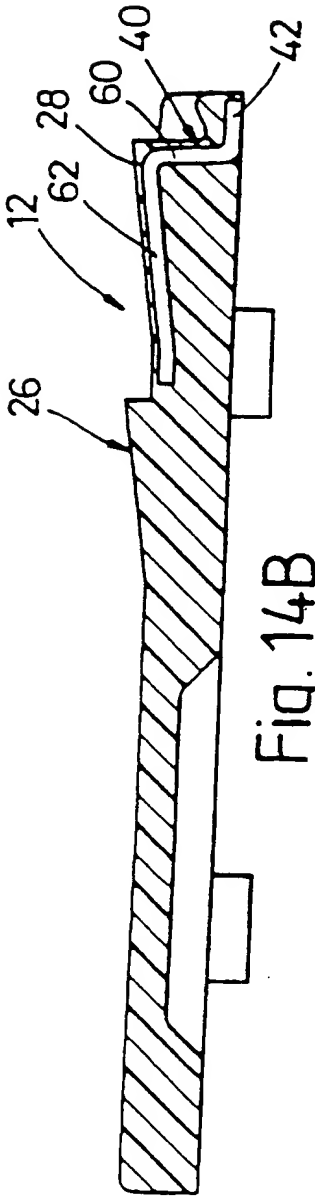


Fig. 14B

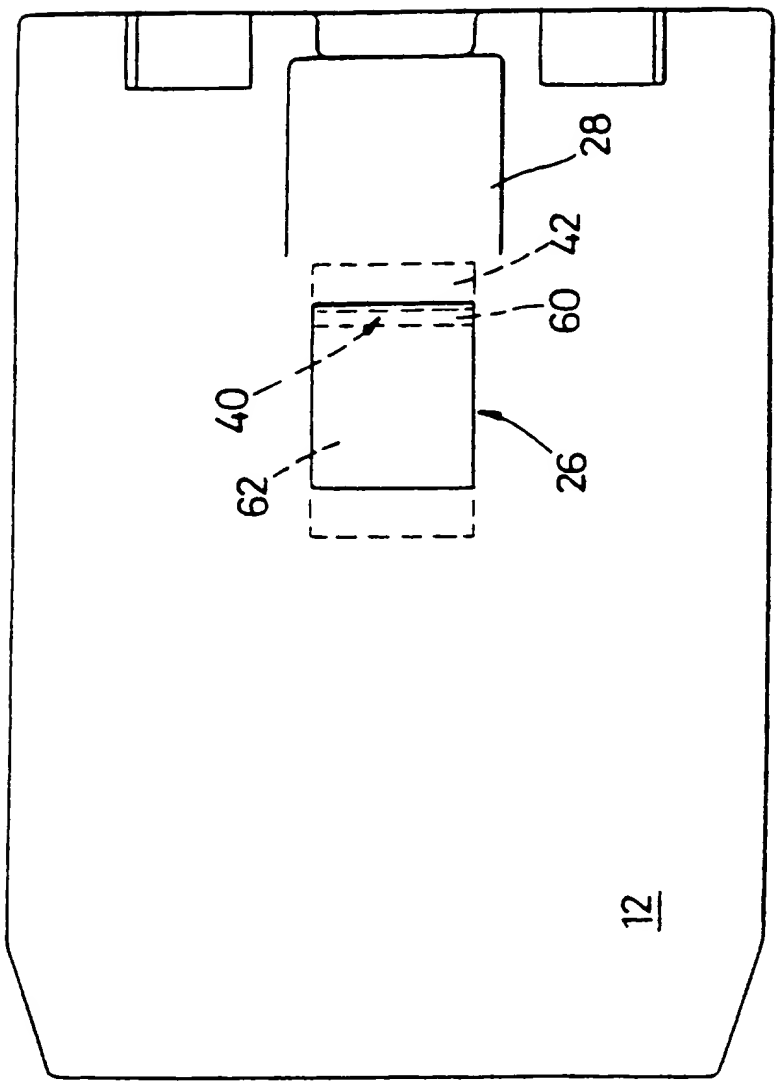


Fig. 15A

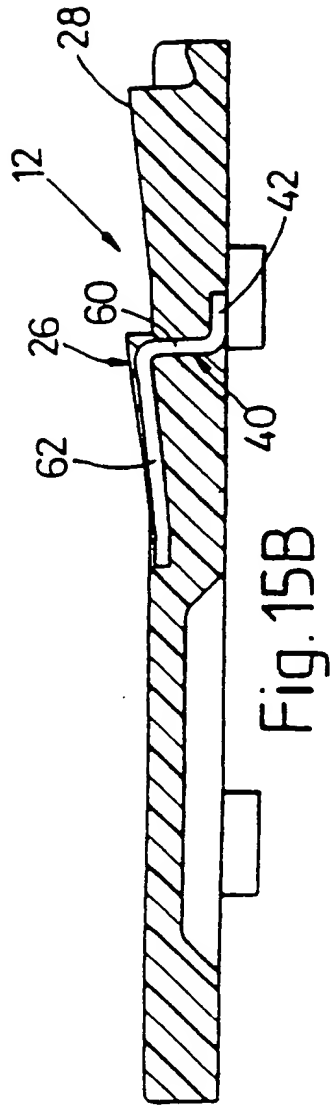


Fig. 15B

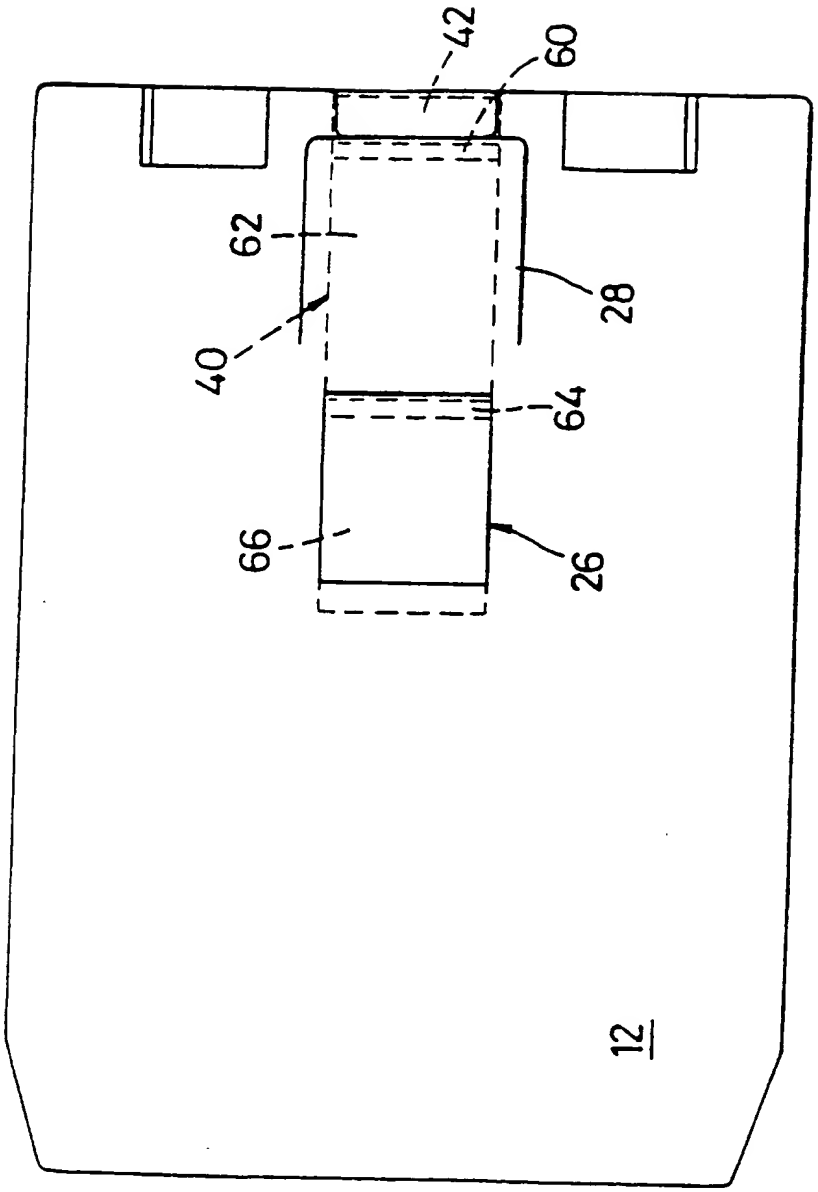


Fig. 16A

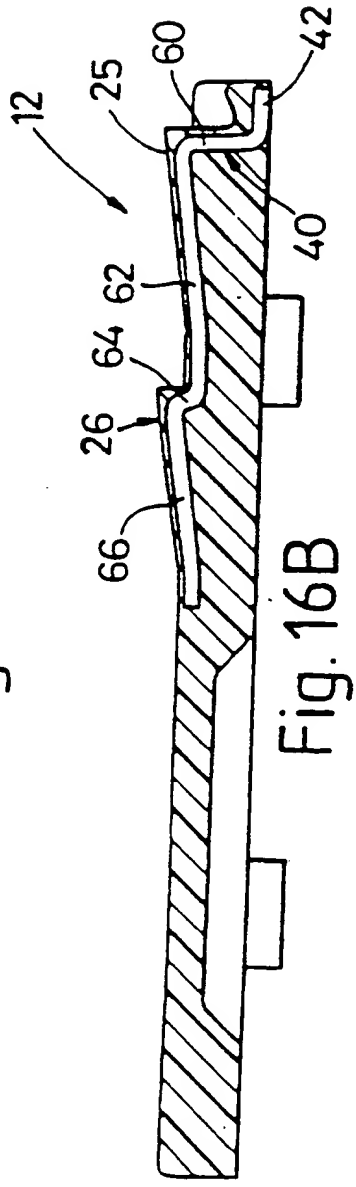


Fig. 16B

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/00625

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B62D55/275

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,3 973 807 (KORNER OTTO ET AL) 10 August 1976 see column 2, line 3 - line 56; figures 1-3	1
A	DE,A,39 09 043 (MAK MASCHINENBAU KRUPP) 20 September 1990 see column 2, line 54 - page 3, line 1; figures 5,6	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 1996	02.07.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Chlosta, P

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 96/00625

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-3973807	10-08-76	DE-B-	2336742	17-10-74
		DE-U-	7326485	16-01-75
		AU-B-	7116474	15-01-76
		CA-A-	1014756	02-08-77
DE-A-3909043	20-09-90	NONE		